



BFD on IP Unnumbered Interfaces

This feature module describes how to enable BFD on IP unnumbered interfaces.



Note This feature is applicable only for Cisco ASR 900 RSP2 Module.

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Information about BFD on IP Unnumbered Interfaces

Cisco ASR 900 RSP2 Module supports BFD to run on IP unnumbered interfaces, which take the IP address from the loopback address. You can use the same loopback address on multiple interfaces. Physical, BDI, and Port-channel interfaces are supported for BFD on IP unnumbered interfaces. Single hop with authentication and Segment-routing (SR) are supported with BFD on IP unnumbered interfaces.

Prerequisites for BFD on IP Unnumbered Interfaces

- point-to-point keyword is mandatory for BFD on IP unnumbered interfaces:
ip unnumbered Loopback <> poll point-to-point
- point-to-point keyword should be enabled on client protocols for ISIS and OSPF:
ip ospf network point-to-point
isis network point-to-point

Restrictions for BFD on IP Unnumbered Interfaces

- BFD on IP unnumbered interface is supported only with ISIS and OSPF.
- Echo mode is not supported.
- BFD on IP unnumbered interface is not supported for IPv6.
- BFD dampening is not supported.
- MHBFD is not supported for the clients of OSPF and ISIS.

Configuring BFD on IP Unnumbered Interfaces

Procedure

Step 1 **enable**

Example:

```
Device> enable
```

Enables privileged EXEC mode.

Enter your password if prompted.

Step 2 **configure terminal**

Example:

```
router#configure terminal
```

Enters global configuration mode.

Step 3 **bfd-template single-hop** *template-name*

Example:

```
Router(config)# bfd-template single-hop bfdtemplate1
```

Creates a single-hop BFD template and enters BFD configuration mode.

Step 4 **interval min-tx** *milliseconds* **min-rx** *milliseconds* **multiplier** *multiplier-value*

Example:

```
Router(bfd-config)# interval min-tx 120 min-rx 100 multiplier 3
```

Configures the transmit and receive intervals between BFD packets, and specifies the number of consecutive BFD control packets that must be missed before BFD declares that a peer is unavailable.

Step 5 **interface loopback** *instance*

Example:

```
router#interface loopback 0
```

Creates a loopback interface and enter the interface config mode.

Step 6 **ip address** *address subnet mask*

Example:

```
router(config-if)#ip address 21.21.21.21 255.255.255.255
```

Configures an IP address for this loopback interface.

Step 7 **ip router isis** *area-tag*

Example:

```
router(config-if)#ip router isis 1
```

Configures an IS-IS routing process for the IP on the configured interface and attaches an area designator to the routing process.

Step 8 **ip ospf process id area** *area id*

Example:

```
router(config-if)# ip ospf 1 area 0
```

Enables OSPFv2 on an interface.

Step 9 **interface gigabitethernet***slot/subslot/port*

Example:

```
router(config-if)#interface gigabitethernet0/0/3
```

Configures the interface type as gigabitethernet.

Step 10 **ip unnumbered Loopback** *interface poll point-to-point*

Example:

```
router(config-if)# ip unnumbered Loopback 0 poll point-to-point
```

Enables IP unnumbered processing on the loopback interface with point-to-point host polling.

Step 11 **no ip redirects**

Example:

```
router(config-if)# no ip redirects
```

Disables ICMP redirect messages.

Step 12 **ip router isis** *process tag*

Example:

```
router (config-if)#ip router isis 1
```

Enable IS-IS as an IP routing protocol on the routers, and assign a tag to the process.

Step 13 **ip ospf network** *point-to-point*

Example:

```
router(config-if)#ip ospf network point-to-point
```

Configures an OSPFv2 point-to-point link on the interface.

Step 14 **ip ospf bfd**

Example:

```
router(config-if)#ip ospf bfd
```

Enables BFD on the OSPFv2 interface.

Step 15 **ip ospf** *process id* **area** *area id***Example:**

```
router(config-if)# ip ospf 1 area 0
```

Enables OSPFv2 on an interface.

Step 16 **isis network** **point-to-point****Example:**

```
router(config-if)#isis network point-to-point
```

Configures an IS-IS network into a point-to-point network.

Step 17 **bfd template** *template name*

Enables the BFD template.

Step 18 **router ospf** *process id***Example:**

```
router(config-if)#router ospf 1
```

Enables OSPF routing protocol on the router and attaches a process ID.

Step 19 **router-id** *router id***Example:**

```
router(config-router) router-id 209.165.201.0
```

Assigns the router ID on the OSPF router.

Step 20 **bfd all-interfaces** **strict-mode****Example:**

```
router(config-router)#bfd all-interfaces strict-mode
```

Enables BFD strict-mode for OSPF on all interfaces.

Step 21 **router isis** *area tag***Example:**

```
router(config-router)#router isis 1
```

Assigns a tag to an IS-IS process. Enters router configuration mode.

Step 22 **net** *network entity title***Example:**

```
router(config-router)#net 49.0001.0000.0000.0000.000a.00
```

Configures the NET on the device. The NET identifies the device for IS-IS.

Step 23 **is-type** **level-2-only****Example:**

```
router(config-router)#is-type level-2-only
```

Defines the routing level of the IS-IS routing process as level 2.

Step 24 **metric-style wide**

Example:

```
router(config-router)#metric-style wide
```

Configures a router running IS-IS so that it generates and accepts only new-style TLVs.

Step 25 **log-adjacency-changes**

Example:

```
router(config-router)#log-adjacency-changes
```

Configures the router to send a syslog message when the state of an OSPF neighbor changes.

Step 26 **bfd all-interfaces**

Example:

```
router(config-router)#bfd all-interfaces
```

Enables BFD for all of the interfaces for which IS-IS is routing.

Verifying BFD on IP Unnumbered Interface Configuration

To verify the BFD on IP unnumbered interface configuration, use the show commands given below:

```
Router#show bfd neighbors
IPv4 Sessions
  NeighAddr          LD/RD          RH/RS          State          Int          Gi0/0/3
  1.1.1.1             1/3            1/3            Up             Up             Po10
  3.3.3.3             1025/1025     Up             Up             Po10

Router#show bfd neighbors detail
IPv4 Sessions
  NeighAddr          LD/RD          RH/RS          State          Int
  1.1.1.1             1/3            Up             Up             Gi0/0/3
Session state is UP and not using echo function.
Session Host: Hardware
OurAddr: 21.21.21.21
Handle: 1
Local Diag: 0, Demand mode: 0, Poll bit: 0
MinTxInt: 50000, MinRxInt: 50000, Multiplier: 3
Received MinRxInt: 50000, Received Multiplier: 3
Holddown (hits): 0(0), Hello (hits): 50(0)
Rx Count: 4304
Tx Count: 4306
Elapsed time watermarks: 0 0 (last: 0)
Registered protocols: OSPF CEF ISIS FRR
Uptime: 00:02:41
Last packet: Version: 1      - Diagnostic: 0
State bit: Up                - Demand bit: 0
Poll bit: 0                  - Final bit: 0
C bit: 1
Multiplier: 3                - Length: 24
My Discr.: 3                  - Your Discr.: 1
```

```
Min tx interval: 50000      - Min rx interval: 50000
Min Echo interval: 0
```

Example: Configuration of BFD on IP Unnumbered Interfaces

Configuration on router 1:

```
key chain cisco
key 1
  key-string bfd
!
segment-routing mpls
!
set-attributes
  address-family ipv4
  sr-label-preferred
  exit-address-family
!
global-block 20000 30000
!
connected-prefix-sid-map
  address-family ipv4
  21.21.21.21/32 index 2222 range 1
  22.22.22.22/32 index 2223 range 1
  23.23.23.23/32 index 2224 range 1
  exit-address-family
!
bfd-template single-hop TEST
interval min-tx 500 min-rx 500 multiplier 3
authentication md5 keychain cisco

interface Loopback0
ip address 21.21.21.21 255.255.255.255
ip router isis 1
ip ospf 1 area 0
!
interface Loopback1
ip address 22.22.22.22 255.255.255.255
ip router isis 1
ip ospf 1 area 0
!
interface Loopback2
ip address 23.23.23.23 255.255.255.255
ip router isis 1
ip ospf 1 area 0
!
interface Port-channel10
ip unnumbered Loopback1 poll point-to-point
no ip redirects
ip router isis 1
ip ospf network point-to-point
ip ospf bfd
ip ospf 1 area 0
load-interval 30
negotiation auto
mpls ip
bfd template TEST
isis network point-to-point
!
interface GigabitEthernet0/0/3
ip unnumbered Loopback0 poll point-to-point
no ip redirects
```

```

ip router isis 1
ip ospf network point-to-point
ip ospf bfd
ip ospf 1 area 0
load-interval 30
negotiation auto
mpls ip
bfd interval 50 min_rx 50 multiplier 3
isis network point-to-point
!
router ospf 1
router-id 21.21.21.21
segment-routing mpls
segment-routing prefix-sid-map advertise-local
fast-reroute per-prefix enable prefix-priority low
fast-reroute per-prefix ti-lfa area 0
  fast-reroute keep-all-paths
bfd all-interfaces strict-mode
!
router isis 1
net 49.0001.0000.0000.0000.000a.00
is-type level-2-only
metric-style wide
log-adjacency-changes
segment-routing mpls
segment-routing prefix-sid-map advertise-local
fast-reroute per-prefix level-2 all
fast-reroute ti-lfa level-2
bfd all-interfaces
!

```

Configuration on router 2:

```

key chain cisco
key 1
  key-string bfd
!
segment-routing mpls
!
set-attributes
  address-family ipv4
  sr-label-preferred
  exit-address-family
!
global-block 20000 30000
!
connected-prefix-sid-map
  address-family ipv4
  1.1.1.1/32 index 1111 range 1
  2.2.2.2/32 index 1112 range 1
  3.3.3.3/32 index 1113 range 1
  exit-address-family
!
interface Loopback0
ip address 1.1.1.1 255.255.255.255
ip router isis 1
ip ospf 1 area 0
!
interface Loopback1
ip address 2.2.2.2 255.255.255.255
ip router isis 1
ip ospf 1 area 0
!
interface Loopback2
ip address 3.3.3.3 255.255.255.255

```

Example: Configuration of BFD on IP Unnumbered Interfaces

```

ip router isis 1
ip ospf 1 area 0
!
interface Port-channel10
ip unnumbered Loopback2 poll point-to-point
no ip redirects
ip router isis 1
ip ospf network point-to-point
ip ospf bfd
ip ospf 1 area 0
load-interval 30
negotiation auto
mpls ip
bfd template TEST
isis network point-to-point
!
interface GigabitEthernet0/0/0
ip unnumbered Loopback0 poll point-to-point
no ip redirects
ip router isis 1
ip ospf network point-to-point
ip ospf bfd
ip ospf 1 area 0
load-interval 30
negotiation auto
mpls ip
bfd interval 50 min_rx 50 multiplier 3
no bfd echo
isis network point-to-point
!
router ospf 1
router-id 1.1.1.1
segment-routing mpls
segment-routing prefix-sid-map advertise-local
fast-reroute per-prefix enable prefix-priority low
fast-reroute per-prefix ti-lfa area 0
  fast-reroute keep-all-paths
bfd all-interfaces strict-mode
!
router isis 1
net 49.0001.0000.0000.0000.000b.00
is-type level-2-only
metric-style wide
log-adjacency-changes
segment-routing mpls
segment-routing prefix-sid-map advertise-local
fast-reroute per-prefix level-2 all
fast-reroute ti-lfa level-2
bfd all-interfaces
!
sh bfd neighbors

IPv4 Sessions
NeighAddr          LD/RD          RH/RS    State    Int
11.11.11.11        1/2            Up       Up       Gi0/0/3
12.12.12.12        1026/1025     Up       Up       Gi0/0/4
13.13.13.13        2/1            Up       Up       BD111
21.21.21.21        3/1            Up       Up       Gi0/0/0
22.22.22.22        1025/1025     Up       Up       Po10
BGL-PEGASUS#
sh bfd neighbors detail

IPv4 Sessions
NeighAddr          LD/RD          RH/RS    State    Int

```



```

11.11.11.11          1/2          Up          Up          Gi0/0/3
Session state is UP and not using echo function.
Session Host: Hardware
OurAddr: 1.1.1.1
Handle: 3
Local Diag: 0, Demand mode: 0, Poll bit: 0
MinTxInt: 50000, MinRxInt: 50000, Multiplier: 3
Received MinRxInt: 50000, Received Multiplier: 3
Holddown (hits): 0(0), Hello (hits): 50(0)
Rx Count: 2392
Tx Count: 2413
Elapsed time watermarks: 0 0 (last: 0)
Registered protocols: OSPF CEF ISIS FRR
Uptime: 00:01:46
Last packet: Version: 1          - Diagnostic: 0
              State bit: Up      - Demand bit: 0
              Poll bit: 0        - Final bit: 0
              C bit: 1
              Multiplier: 3      - Length: 24
              My Discr.: 2       - Your Discr.: 1
              Min tx interval: 50000 - Min rx interval: 50000
              Min Echo interval: 50000

```

```

IPv4 Sessions
NeighAddr          LD/RD          RH/RS          State          Int
12.12.12.12       1026/1025     Up             Up             Gi0/0/4
Session state is UP and not using echo function.
Session Host: Software
OurAddr: 2.2.2.2
Handle: 4
Local Diag: 0, Demand mode: 0, Poll bit: 0
MinTxInt: 500000, MinRxInt: 500000, Multiplier: 3
Received MinRxInt: 500000, Received Multiplier: 3
Holddown (hits): 1296(0), Hello (hits): 500(331)
Rx Count: 332, Rx Interval (ms) min/max/avg: 1/504/440 last: 204 ms ago
Tx Count: 332, Tx Interval (ms) min/max/avg: 1/504/439 last: 320 ms ago
Elapsed time watermarks: 0 0 (last: 0)
Registered protocols: OSPF CEF FRR ISIS
Template: TEST
Authentication(Type/Keychain): md5/cisco
last_tx_auth_seq: 4 last_rx_auth_seq 6
Uptime: 00:02:25
Last packet: Version: 1          - Diagnostic: 0
              State bit: Up      - Demand bit: 0
              Poll bit: 0        - Final bit: 0
              C bit: 0
              Multiplier: 3      - Length: 48
              My Discr.: 1025    - Your Discr.: 1026
              Min tx interval: 500000 - Min rx interval: 500000
              Min Echo interval: 0

```

```

IPv4 Sessions
NeighAddr          LD/RD          RH/RS          State          Int
13.13.13.13       2/1           Up             Up             BD111
Session state is UP and not using echo function.
Session Host: Hardware
OurAddr: 3.3.3.3
Handle: 5
Local Diag: 0, Demand mode: 0, Poll bit: 0
MinTxInt: 300000, MinRxInt: 300000, Multiplier: 3
Received MinRxInt: 300000, Received Multiplier: 3
Holddown (hits): 0(0), Hello (hits): 300(0)
Rx Count: 502
Tx Count: 504

```

Example: Configuration of BFD on IP Unnumbered Interfaces

```

Elapsed time watermarks: 0 0 (last: 0)
Registered protocols: OSPF CEF FRR ISIS
Uptime: 00:02:22
Last packet: Version: 1           - Diagnostic: 0
              State bit: Up       - Demand bit: 0
              Poll bit: 0         - Final bit: 0
              C bit: 1
              Multiplier: 3       - Length: 24
              My Discr.: 1       - Your Discr.: 2
              Min tx interval: 300000 - Min rx interval: 300000
              Min Echo interval: 0

IPv4 Sessions
NeighAddr          LD/RD          RH/RS    State    Int
21.21.21.21       3/1           Up       Up       Gi0/0/0
Session state is UP and not using echo function.
Session Host: Hardware
OurAddr: 1.1.1.1
Handle: 1
Local Diag: 0, Demand mode: 0, Poll bit: 0
MinTxInt: 50000, MinRxInt: 50000, Multiplier: 3
Received MinRxInt: 50000, Received Multiplier: 3
Holddown (hits): 0(0), Hello (hits): 50(0)
Rx Count: 4305
Tx Count: 4323
Elapsed time watermarks: 0 0 (last: 0)
Registered protocols: OSPF CEF ISIS FRR
Uptime: 00:02:59
Last packet: Version: 1           - Diagnostic: 0
              State bit: Up       - Demand bit: 0
              Poll bit: 0         - Final bit: 0
              C bit: 1
              Multiplier: 3       - Length: 24
              My Discr.: 1       - Your Discr.: 3
              Min tx interval: 50000 - Min rx interval: 50000
              Min Echo interval: 50000

IPv4 Sessions
NeighAddr          LD/RD          RH/RS    State    Int
22.22.22.22       1025/1025     Up       Up       Po10
Session state is UP and not using echo function.
Session Host: Software
OurAddr: 3.3.3.3
Handle: 2
Local Diag: 0, Demand mode: 0, Poll bit: 0
MinTxInt: 500000, MinRxInt: 500000, Multiplier: 3
Received MinRxInt: 500000, Received Multiplier: 3
Holddown (hits): 1232(0), Hello (hits): 500(393)
Rx Count: 393, Rx Interval (ms) min/max/avg: 4/504/440 last: 268 ms ago
Tx Count: 396, Tx Interval (ms) min/max/avg: 4/504/437 last: 268 ms ago
Elapsed time watermarks: 0 0 (last: 0)
Registered protocols: CEF OSPF FRR ISIS
Template: TEST
Authentication(Type/Keychain): md5/cisco
last_tx_auth_seq: 5 last_rx_auth_seq 4
Uptime: 00:02:53
Last packet: Version: 1           - Diagnostic: 0
              State bit: Up       - Demand bit: 0
              Poll bit: 0         - Final bit: 0
              C bit: 0
              Multiplier: 3       - Length: 48
              My Discr.: 1025     - Your Discr.: 1025
              Min tx interval: 500000 - Min rx interval: 500000
              Min Echo interval: 0

```

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS XE Command Reference	Cisco IOS IP Routing: Protocol-Independent Command Reference

Standards and RFCs

Standard/RFC	Title
RFC 5880	Bidirectional Forwarding Detection (BFD)

MIBs

MB	MIBs Link
NA	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

Technical Assistance

Description	Link
<p>The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies.</p> <p>To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds.</p> <p>Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.</p>	http://www.cisco.com/support

Feature Information for BFD on IP Unnumbered Interfaces

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 1: Feature Information for BFD on IP Unnumbered Interfaces

Feature Name	Releases	Feature Information
BFD on IP Unnumbered Interfaces	Cisco IOS XE Everest 16.5.1	<p>In Cisco IOS XE Everest 16.5.1, BFD is supported to run on IP unnumbered interfaces, which take the IP address from the loopback address. You can use the same loopback address on multiple interfaces.</p> <p>In Cisco IOS XE Everest 16.5.1, support was added for the Cisco ASR 903 router.</p>